

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Yoichi Mizuno

Group Art Unit: 1713

Serial Number: 10/625,591

Examiner: Peter D. Mulcahy

Filed: July, 24, 2003

For: RUBBER COMPOSITION AND PNEUMATIC TIRE USING THE
SAME

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

Yoichi Mizuno residing at 2-3-1301, Mukogawachou,
Namase, Nishinomiya-shi, Hyogo-ken, Japan duly deposes and says:

1. That he graduated from Department of applied chemistry, Faculty of Engineering, Nagoya Engineering University, Nagoya, Japan, in the year 1990, and he received the degree of Master of material engineering from Graduate School of Nagoya Engineering University, Nagoya, Japan in the year 1992;

2. That since 1992, he has been employed in the capacity of Sumitomo Rubber Industries, Ltd.;

3. That from 2003 he has been engaged in development for rubber compositions of tires for passage cars;

4. That he has read and is familiar with the instant application for United States Letters Patent and Office Action thereto

mailed October 12, 2006.; and

5. That he has made experiments in order to show that extremely excellent effect of especially wet gripping property can be obtained only when the average particle size of the particles (C) is 30 to 500 μ m.

Experimental Examples 1 to 3

Tires were obtained in the same manner as Examples 1 to 3 and Comparative Examples 1 to 3 of the present specification. The compositions shown in Table 1 except for sulfur and vulcanization accelerator were kneaded by using a Banbury mixer for 5 to 10 minutes. Sulfur and the vulcanization accelerators were added to the kneaded composition and the mixture was kneaded at 80°C for 5 minutes by using a twin-screw open roll. The mixture was vulcanized at 170°C for 12 minutes to obtain a rubber composition. Tires were prepared by using the obtained rubber composition for tread according to the usual method. Wet gripping property, performance on ice and snow and abrasion resistance of the obtained tires were evaluated in the same manner as Examples 1 to 3 and Comparative Examples 1 to 3 of the present specification. The results are shown in TABLE 1. In TABLE 1, Example 1 of the present specification is also described for comparison.

TABLE 1

		Ex.		Ex.
		Ex.		Ex.
	1	2	3	1
Composition (Part by weight)				
NR	70	70	70	70
BR	30	30	30	30
Carbon black	45	45	45	45
Glass fiber	10	10	10	10
Emery	—	—	—	5
Higilite H43	5	—	—	—
Higilite H21	—	5	—	—
Crystal	—	—	5	—
Starch/Plasticizer composite material	5	5	5	5
Silane coupling agent	0.5	0.5	0.5	0.5
Oil	15	15	15	15
Wax	2	2	2	2
Antioxidant	2	2	2	2
Stearic acid	3	3	3	3
Zinc Oxide	5	5	5	5
Sulfur	1	1	1	1
Vulcanization accelerator	1.5	1.5	1.5	1.5
Glass fiber in the rubber				
Average fiber diameter (μm)	33	33	33	33
Average fiber length (mm)	0.25	0.25	0.25	0.25
Particles in the rubber				
Moh's hardness	3	3	7.5	7 to 8
Average particle size (μm)	0.6	25	35	100
Property				
Wet gripping property	102	103	106	108
Performance on ice and snow	101	102	101	102
Abrasion resistance	105	102	100	98

Natural rubber (NR): RSS #3

Butadiene rubber (BR): UBEPOL BR150B available from Ube Industries,

Ltd.

Carbon black: SHOWBLACK N220 (N_2SA : 111 m^2/g , DBP oil absorption: 111 ml/100g) available from Cabot Japan Co. Ltd.

Glass fiber: available from Nippon Sheet Glass Co., Ltd. (average fiber diameter: 33 μm , average fiber length: 6 mm (before dispersing in the rubber), Moh's hardness: 5)

Emery: prepared for this experiment (average particle size: 100 μm , Moh's hardness: 7 to 8)

Higilite H43: Higilite H43 (average particle size: 0.6 μm , Moh's hardness: 3) available from SHOWA DENKO K. K.

Higilite H21: Higilite H21 (average particle size: 25 μm , Moh's hardness: 3)

Crystal: prepared for this experiment (average particle size: 35 μm , Moh's hardness: 7.5)

Starch/plasticizer composite material: Mater Bi 1128R (Starch/plasticizer weight ratio: about 1.5/1, plasticizer: poly(ethylene vinyl alcohol), weight ratio of amylose unit to amylopectin unit of starch: about 1/3, softening point: about 147°C) available from Novamont Company

Silane coupling agent: Si69 (bis(3-triethoxysilylpropyl)tetrasulfide) available from Degussa Co.

Oil: Diana Process oil PS 32 available from Idemitsu Kosan Co., Ltd.

Wax: SUNNOC Wax available from Ouchi Shinko Chemical Industrial Co., Ltd.

Antioxidant: Santoflex 13 available from FLEXSYS CO.

Stearic Acid: KIRI available from NOF Corporation

Zinc oxide: Zinc Oxide Type 2 available from Mitsui Mining and

Smelting Co., Ltd.

Sulfur: Sulfur available from Karuizawa Iou Kabushiki Kaisha

Vulcanization Accelerator: Nocceler NS available from Ohuchi Shinko
Kagaku Kogyo Co., Ltd.

Result and Discussion

According to TABLE 1, extremely excellent effect of especially wet gripping property can be obtained only when the average particle size of the particles (C) is 30 to 500 μ m.

The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 6th day of March, 2007

by Yoichi Mizuno
Yoichi Mizuno

We, the undersigned witnesses, hereby acknowledge that Yoichi Mizuno is personally known to us and did execute the foregoing Declaration in our presence on:

Date: March 6, 2007

Witness Yutaka Sakon

Date: March 6, 2007

Witness Yoshiaki Someya